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(71) Applicant:
Nokia Satellite Systems AB
59183 Motala (SE)

(72) Inventor: **Fogelström, Gunnar**
59172 Motala (SE)

(74) Representative:
Onn, Thorsten et al
AB STOCKHOLMS PATENTBYRA,
Zacco & Bruhn,
Box 23101
104 35 Stockholm (SE)

(54) Antenna alignment method and device

(57) The invention relates to a method and a device for aligning the direction of an antenna with a transmitter to give the best possible picture and sound when receiving digital signals. With regard to digital TV, an image (5) for adjusting the antenna is called-up, whereby the image (5) includes a signal indicator (20) that uses one and the same scale (12-19) to indicate signal quality for the reception using two different methods (110, 130) for measuring the quality of the signal.

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Description

Technical area

[0001] The present invention relates to a method and a device for aligning the direction of an antenna connected to a receiver for digital signals.

The prior art

[0002] When a satellite receiver is installed, it is necessary to mount a parabolic antenna and align the microwave head arranged on the antenna so that signals from the transmitting satellite reach the said microwave head. To achieve this objective, external instruments or, alternatively, aids built into the satellite receiver must be used.

[0003] The above aids work well when receiving analog signals, and it is sufficient to "follow the picture", i.e. to adjust the parabolic dish so that a weakly received analog signal gradually becomes a stronger, acceptable signal. This procedure does not function when receiving digital signals as the technology is built around "all or nothing", i.e. "1" or "0".

[0004] Several years ago, Nokia® presented a new installation technology for digital satellite receivers with antenna adjustment. The technology in question is built around a signal indicator that displays bit errors (BER, Bit Error Rate) when a weak signal is received. When the BER then becomes better as the correct adjustment of the received signal is approached, the receiver begins to transfer pictures/sound. There nevertheless remain problems with this technology in that good measurement values do not exist a long way from the signal that is to be received, i.e. if the signal is not digital, bit errors do not exist.

[0005] Another solution to the said problem consists of using a signal indicator to show "signal-to-noise" (AGC, Automatic Gain Control), which is shown as a kind of rough adjustment via an indicator, after which BER was presented as a fine adjustment via another indicator.

[0006] A dilemma of all the solutions for installing a satellite receiver today is that they do not offer a total solution for installing the receiver via a single signal indicator in one unified sequence from the receiver being unpacked to the antenna being aligned with the transmitting satellite.

Summary of the invention

[0007] The present invention relates to a method and a device for aligning the direction of an antenna connected to a receiver for digital signals in accordance with the enclosed independent claims.

[0008] Specific embodiments of the invention are evident from the enclosed non-independent claims.

[0009] To achieve the objective and solve the problems related to the area of technology, the present invention specifies a method of aligning the direction of an antenna connected to a receiver for digital signals. The antenna is aligned at the digital signals using a unified sequence of directions that include at least two methods for measuring the quality of a digital signal and that indicates the quality via one and the same means of indication regarding directions for both methods.

[0010] The first method measures that a digital signal is received, which is indicated on the said means, whereby the means having received the signal automatically switches to showing the quality of the digital signal using a second method.

[0011] In one embodiment of the invention, the first method is AGC (Automatic Gain Control) and the second method is BER (Bit Error Rate).

[0012] In a further embodiment of the invention, the means of indication is a whole screen or occupies part of a screen.

[0013] An alternative embodiment of the invention comprises that the means is part of a portable unit.

[0014] In a specific embodiment, the said scale comprise different colours in a field in the indicator, whereby the best signal quality is obtained when a specific colour occupies a specific field during the alignment of the antenna.

[0015] In yet a further embodiment, an image is called-up during the directions to prompt a user to carry out a unified alignment of the antenna. The picture is partly transparent when an antenna alignment has been made so that a received digital channel appears whose digital signal contents are reproduced on the transparent part of the image.

[0016] In addition, the present invention specifies a device to align an antenna connected to a receiver for digital signals. The device includes:

a means of indication for showing a common sequence of directions when an antenna is aligned towards digital signals;
a means of detection to detect that a digital signal has been received by the receiver by measuring the quality of the signal according to a first method, whereby the quality is indicated on the means of indication;
a means of switching to switch from the first method to a second method for measuring the quality of the signal, whereby the switch-over occurs when a signal has been detected with certainty and the means of indication begins toshow the quality of the signal according to a second method; and
whereby the adjustment of the antenna towards a digital signal is allowed by directions via one single means of indication in a unified sequence on the means of indication.

[0017] In addition, the device includes embodiments in accordance with the non-independent claims

in the procedure according to that above.

Brief description of the illustrations

[0018] The continuation of the description refers to the enclosed figures for a better understanding of the present invention and its different embodiments, whereby

Fig. 1 shows schematically a flow scheme for aligning an antenna towards a transmitter according to the present invention;
Fig. 2 illustrates a television screen with an AGC signal quality indicator in accordance with Fig. 1;
Fig. 3 illustrates a television screen with a BER signal quality indicator in accordance with Fig. 1;
Fig. 4 illustrates another television screen with a BER signal quality indicator in accordance with Fig. 1; and
Fig. 5 illustrates another television screen with a BER signal quality indicator where a digitally processed TV image has been acquired in accordance with Fig. 1.

Detailed description of preferred embodiments

[0019] To clarify the present invention and its different embodiments, the description continues in the form of examples with satellite transmitters and satellite receivers for showing digital television with audio.

[0020] Fig. 1 illustrates a flow scheme for aligning an antenna (in this case a parabolic dish) towards a transmitter according to the present invention.

[0021] Block or step 100 in Fig. 1 shows that a user of a satellite receiver calls-up a special image on their TV receiver for adjusting their antenna, with which the user is guided through the whole adjustment procedure in a unified sequence, via at least two methods for measuring the signal quality, with one and the same means as well as with the same scale for indicating the quality of the signal.

[0022] To adjust or align the antenna with the satellite, it is assumed that the user looks at the called-up page for antenna adjustment on the TV set. It is, however, not excluded that the user has a portable set with an indicator for signal quality according to the present invention, whereby the portable unit is remotely connected with the satellite receiver or TV set for acquiring signal quality information. It is even possible to obtain information via a cable between the portable unit and the other said units. Remote transmission takes place via well-known technology that is built on transmission of electromagnetic beams or ultrasound between connected units.

[0023] In the continued description, reference is made to Figs. 2-5 in connection with a run through of Fig. 1, whereby the designations 1-4 in Fig. 1 (within so-called balloons) refer to Figs. 2-5 respectively.

[0024] The next step 110 in the adjustment procedure is taken if lock-on to the desired channel has not been achieved. In the example according to Fig. 2, channel position 3, Astra® MTV, has been selected for adjusting the antenna with the satellite Astra®.

[0025] As information for aligning the antenna according to Fig. 2, a TV image 5 is acquired with the prompt to select 10 to "Select a predefined channel on ASTRA to be able to get a picture and check the signal strength", which is achieved with the signal quality indicator 20. Here, indicator 20 constitutes part of a screen image (TV picture) 5, whereby it shows the signal quality or strength in AGC according to 110 in Fig. 1. The signal quality shown in Figs. 2-5 on the indicator 20, which is shown as a grey scale in the figures, nevertheless constitutes a colour scale in one embodiment of the invention where the colour on the left of the indicator is red 12 and in the middle, yellow 14. The indicator is divided in to twenty fields, ten on either side of a distinct line in the middle 15. The colour in the field immediately to the right of yellow 14 is green 16, and the colour in the field to the right of the green is blue/green 18. The further the blue/green colour 18 moves to the right in indicator 20 towards field 19, the better the signal quality achieved. The best signal quality that can be acquired with the indicator according to the invention is thus indicated when only field 19 shows the blue/green colour 18.

[0026] When a colour 12, 14, 16 or 18 in the figures is assigned two identical reference designations, the colours are the same.

[0027] AGC (Automatic Gain Control), i.e. signal amplification control is acquired though an AGC circuit that takes its power from either the IF (Intermediate Frequency) amplifier or the audio amplifier, i.e. IF-derived or Audio-derived amplification control respectively. When an incoming signal increases in strength, the AGC amplifier starts to decrease the amplification in the RF and IF steps in the electronics, whereby the level of the output audio signal in the loudspeakers is adjusted. A well-designed AGC system achieves a uniform level for audio output signals.

[0028] The block or step 110 is maintained for alignment until the moment that the signal indication with AGC is acquired on indicator 20, which means that the antenna is "roughly" aligned with Astra® MTV from a digital point of view.

[0029] However, if step 100 in Fig. 1 shows that the indication on the signal indicator 20 is acquired at the same moment (directly) without any special alignment step being performed, step 120 comes into play and step 110 thereby becomes unnecessary, which is also the case after AGC signal indication in step 110.

[0030] Step 120 in Fig. 1 is a condition box that describes the condition of the satellite receiver for deciding if the receiver has locked-on to a digital signal or not locked on to this. If the signal has been lost after step 110 has been performed, the receiver is condi-

tioned to re-enter (NO) condition 110. If, however, the received digital signal is locked-on via AGC measurement, the receiver is switched to automatically begin measuring the signal quality with BER from the same indicator 20, see Fig. 3, which illustrates a television screen with BER signal quality indications in accordance with Fig. 1.

[0031] During digital transfer of signals, BER (Bit Error Rate) is a measurement of the quality of the signal. It is a measurement of the number of incorrectly detected bits that are detected in proportion to the total number of transferred bits expressed in percent.

[0032] Fig. 3 clarifies the signal quality in indicator 20 after the AGC measurement has been performed. It can be seen with the colour indications according to that above that the BER is still high because indicator 20 shows red colours 12 to the left in indicator 20 and blue/green 18 to the right. Better signal quality is acquired the further the blue/green colour 18 is located on the right. Ideally, this colour should only be found in field 19 for optimal quality according to the present embodiment of the invention.

[0033] During continued alignment of the antenna, the indicator 20 acquires a colour scheme in accordance with Fig. 4, which shows another television screen 5 with BER signal quality measurement in accordance with Fig. 1.

[0034] Fig. 4 shows the optimal signal quality for digital reception according to the present embodiment, which is seen in that only field 19 is blue/green 18, whereby the yellow colour 14 is essentially once again found in the centre of indicator 20 surrounded by red 12 to the left and green 16 to the right as seen by the viewer.

[0035] The receiver is now placed in the condition according to step 140 in the flow scheme according to Fig. 1 where it self-tunes to the pre-programmed channel MTV. If the channel is found, conditional step 150, the TV image 22 appears, as is evident from Fig. 5, which illustrates a television screen with a BER signal quality indicator 20 where a digitally processed TV image 22 is acquired in accordance with Fig. 1, whereby the condition in step 160 of the flow scheme then becomes active.

[0036] To conclude the alignment of the antenna using the specially called-up image 5, the user activates 170 the OK icon in Fig. 5 and the called-up image is switched off 180, whereby the tuned-in digital TV channel MTV appears and occupies the whole of the screen.

[0037] The blocks or steps in the flow scheme with the conditions 130, 140 respectively 160 can naturally be omitted if the provisions for the condition are already fulfilled before the next condition ensues.

[0038] The present invention also relates to a device for aligning an antenna connected to a receiver for digital signals. In one embodiment, the device includes a means of indication 5, 20 for showing a unified sequence 10, 12-19 of directions when an antenna is aligned towards digital signals, and a means of detection in the receiver for detecting that a digital signal has been received by the receiver by measuring the quality of the signal according to a first method such as AGC. The quality is shown simultaneously on the means of indication 20.

[0039] In addition, the device includes a means of switching for switching from the first method to a second method for measuring the quality of the signal, whereby the switching takes place when a signal has been detected with certainty and the means of indication switches to showing the quality of the signal according to a second method. Such a means of switching can be a program function that switches between, for example, two drive routines for a graphical reproduction of indicator 20 with scale 12-19 in AGC and BER.

[0040] The actual alignment of the antenna with the digital signal is allowed using indications on a scale 12-19 via a single means of indication 20 in a unified sequence on the means of indication.

[0041] The device allows embodiments in accordance with that specified in the method according to that stated above.

[0042] The present invention is not limited to the embodiments described here. Instead, it is the drafting of the enclosed claims that specifies further possible embodiments for a person skilled within the area of technology.

Claims

1. Method for aligning the direction of an antenna connected to a receiver for digital signals **characterised** in that the antenna is aligned at the digital signals using a unified sequence of directions (12-19) that includes at least two methods (110, 130) for measuring the quality of a digital signal and that indicate the quality via one and the same means (20) with the same scale for the directions (12-19) with regard to both methods, whereby a first method (110) measures that a digital signal has been received, which is shown on the said means (20), and whereby the device (20), having received the signal, automatically switches to showing the quality of the digital signal by using a second method (130).

2. Method according to claim 1 **characterised** in that the first method is AGC (Automatic Gain Control) and the second method is BER (Bit Error Rate).

3. Method according to claim 1 or 2 **characterised** in that the means for giving directions (20) is a whole screen (5) or occupies part of a screen (5).

4. Method according to claims 1-3 **characterised** in that the means (20) is a part of a portable unit.

5. Method according to claims 1-4 **characterised** in that the scale comprises different colours (12, 14, 16, 18) in the fields in the indicator, whereby the best signal quality is obtained when a specific colour (18) occupies a specific field (19) during the alignment of the antenna.

6. Method according to claims 1-5 **characterised** in that an image (5) is called-up during the directions that prompts a user to carry out a unified alignment of the antenna.

7. Method according to claim 6 **characterised** in that the image (5) becomes partly transparent (22) when an antenna alignment has been made so that a received digital channel appears whose digital signal contents are reproduced on the transparent part of the image.

8. Device for aligning the direction of an antenna connected to a receiver for digital signals **characterised** in that it includes:

a means of indication (20) for showing a common sequence of directions (12-19) when an antenna is aligned towards digital signals;
a means of detection to detect that a digital signal has been received by the receiver by measuring the quality of the signal according to a first method, whereby the quality is indicated on the means of indication (20);
a means of switching to switch from the first method to the second method for measuring the quality of the signal, whereby the switch over occurs when a signal has been detected (120) with certainty and the means of indication (20) begins toshow the quality of the signal according to a second method (130); and
whereby the adjustment of the antenna towards a digital signal is allowed by indications via one single means of indication (20) in a unified sequence (12-19) on the means of indication.

9. Device according to claim 8 **characterised** in that the first method is AGC (Automatic Gain Control) and the second method is BER (Bit Error Rate).

10. Device according to claims 8 and 9 **characterised** in that the means (20) for giving directions is a whole screen (5) or occupies part of a screen.

11. Device according to claims 8-10 **characterised** in that the device is a part of a portable unit.

12. Device according to claims 8-11 **characterised** in that the scale comprises different colours (12, 14, 16, 18) in the fields in the indicator, whereby the best signal quality is obtained when a specific colour (18) occupies a specific field (19) during the alignment of the antenna.

13. Device according to claims 8-12 **characterised** in that an image (5) is called-up during the directions that prompts a user to carry out a unified alignment of the antenna.

14. Device according to claim 13 **characterised** in that the image (5) becomes partly transparent (22) when an antenna alignment has been made so that a received digital channel appears whose digital signal contents are reproduced on the transparent part of the image.

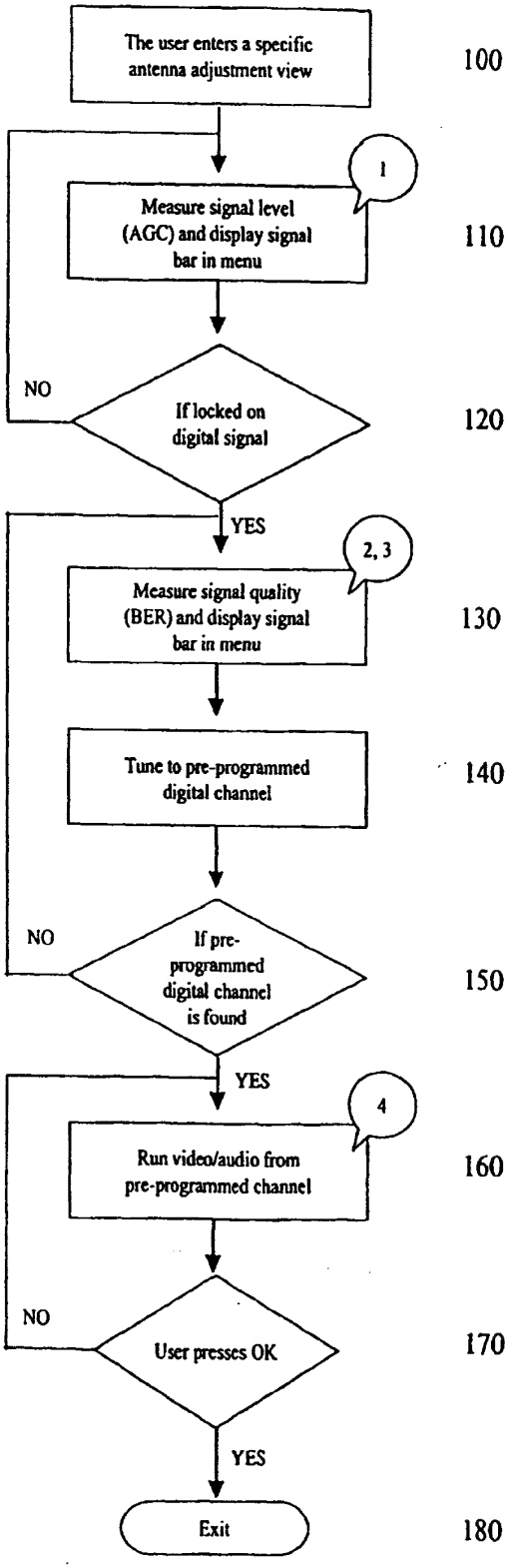
The user enters a specific antenna adjustment view
100
1
Measure signal level (AGC) and display signal bar in menu
110
NO
If locked on digital signal
120
YES
2, 3
Measure signal quality (BER) and display signal bar in menu
130
Tune to pre-programmed digital channel
140
NO
If pre-programmed digital channel is found
150
YES
4
Run video/audio from pre-programmed channel
160
NO
User presses OK
170
YES
Exit
180

Fig. 1

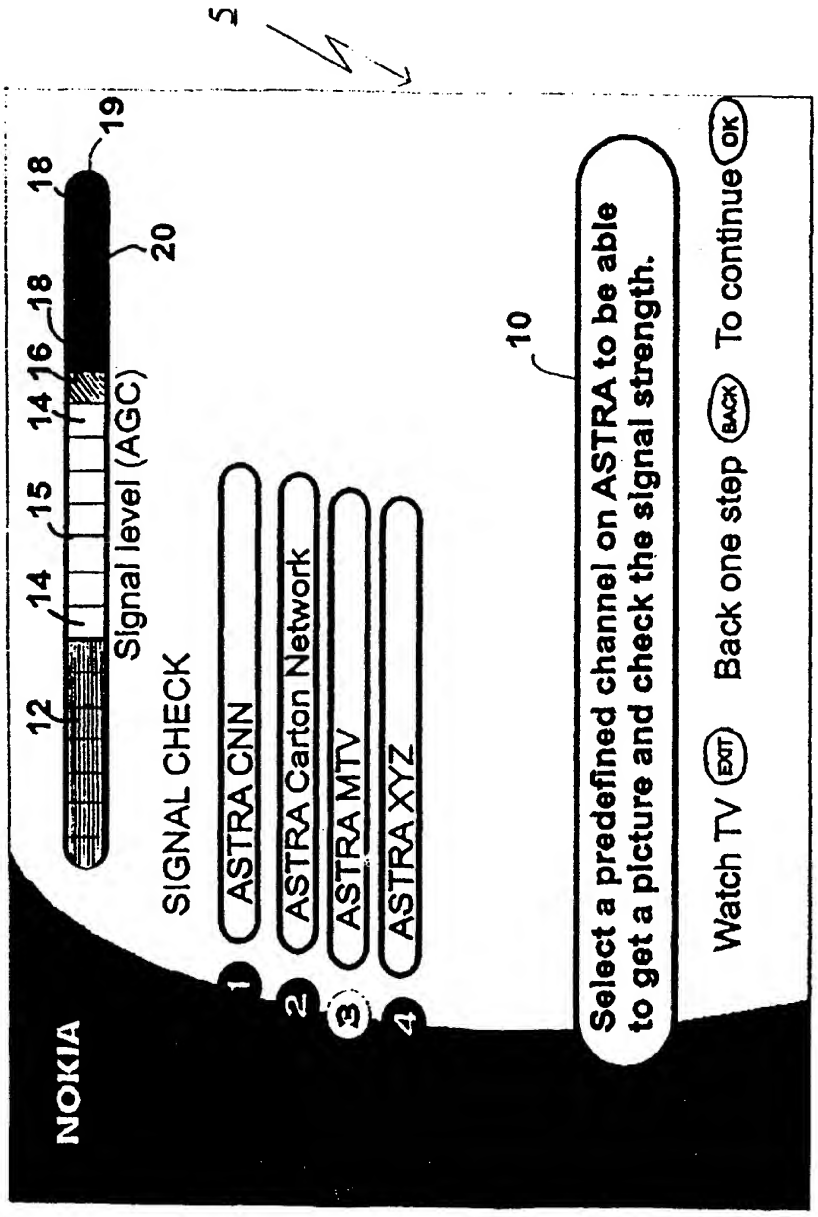
5
NOKIA
SIGNAL CHECK
12
14
15
14
16
18
18
19
20
Signal level (AGC)
1 ASTRA CNN
2 ASTRA Carton Network
3 ASTRA MTV
4 ASTRA XYZ
10
Select a predefined channel on ASTRA to be able to get a picture and check the signal strength.
Watch TV EXIT Back one step BACK To continue OK

Fig. 2

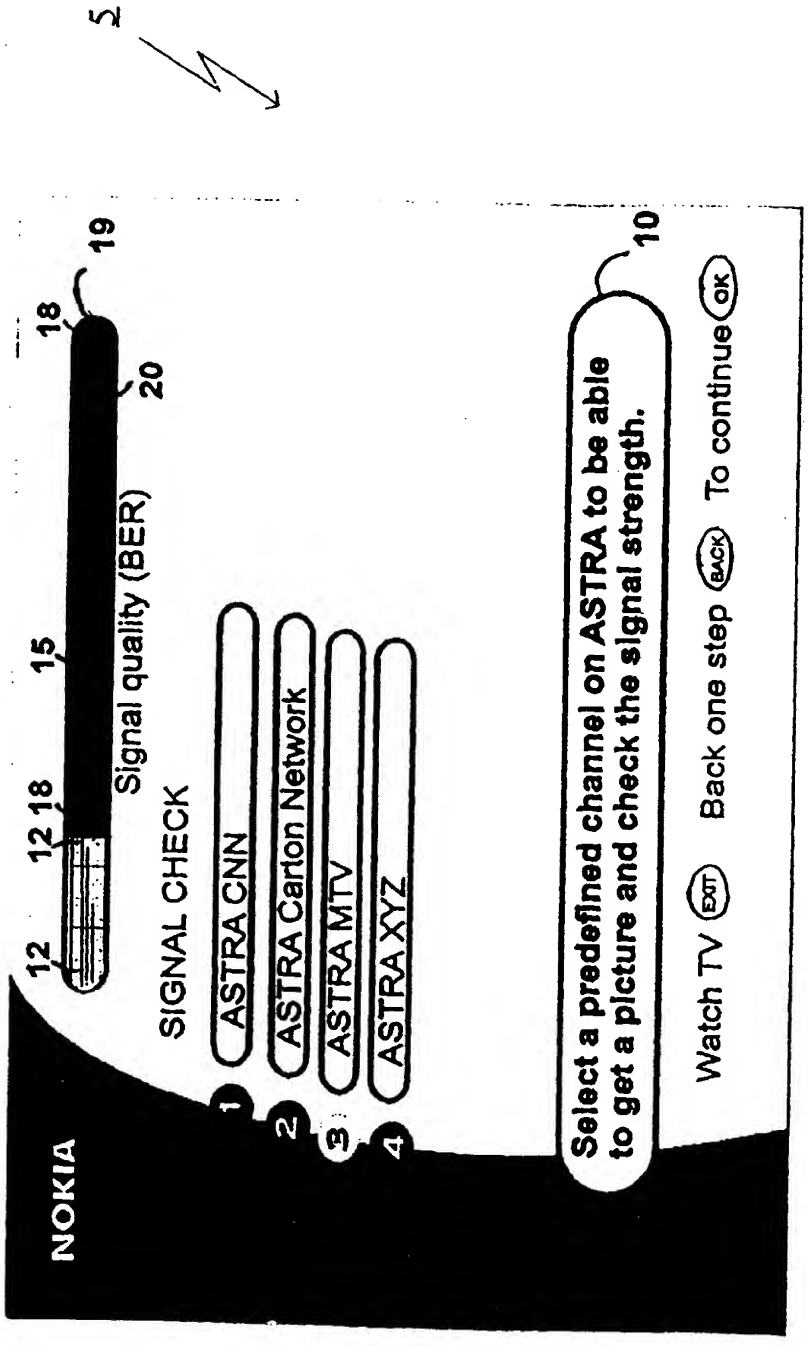
5
NOKIA
SIGNAL CHECK
12
12 18
15
18
19
20
Signal quality (BER)
1 ASTRA CNN
2 ASTRA Carton Network
3 ASTRA MTV
4 ASTRA XYZ
10
Select a predefined channel on ASTRA to be able to get a picture and check the signal strength.
Watch TV EXIT
Back one step BACK
To continue OK

Fig. 3

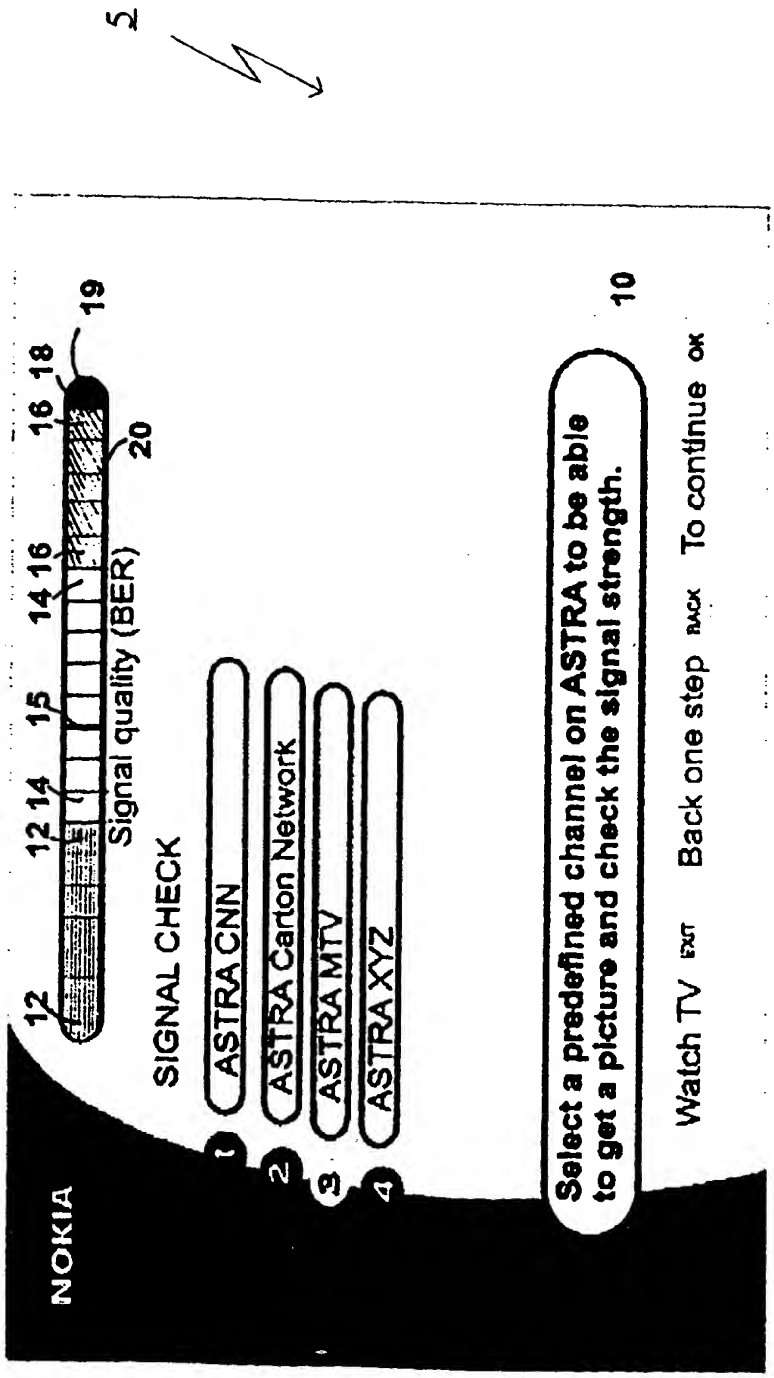
5
NOKIA
12
12 14
15
14 16
16
16 18
19
20
Signal quality (BER)
SIGNAL CHECK
1 ASTRA CNN
2 ASTRA Carton Network
3 ASTRA MTV
4 ASTRA XYZ
Select a predefined channel on ASTRA to be able to get a picture and check the signal strength.
10
Watch TV EXIT
Back one step BACK
To continue OK

Fig. 4

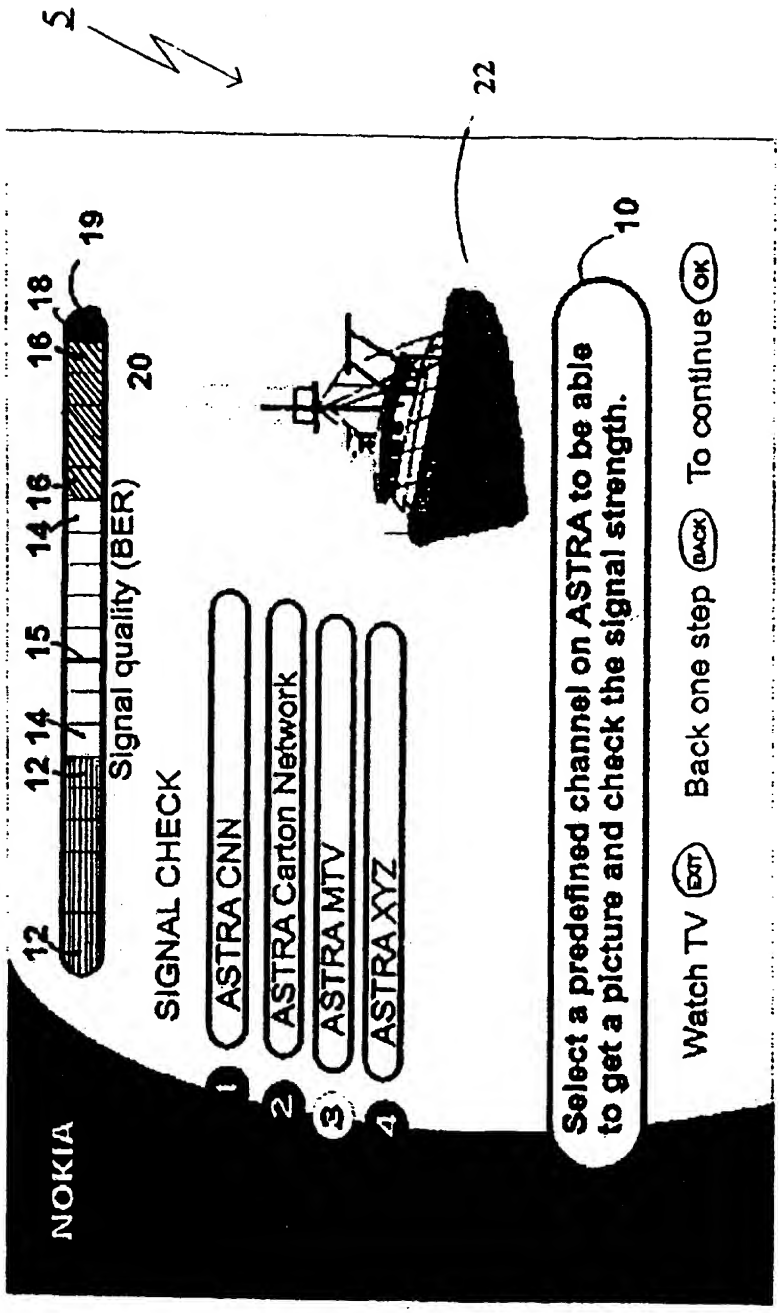
5
22
19
18
18
16
16
14
16
15
14
12
12
20
Signal quality (BER)
SIGNAL CHECK
1 ASTRA CNN
2 ASTRA Carton Network
3 ASTRA MTV
4 ASTRA XYZ
NOKIA
10
Select a predefined channel on ASTRA to be able to get a picture and check the signal strength.
Watch TV EXIT Back one step BACK To continue OK

Fig. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 12 5145

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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A	EP 0 687 029 A (THOMSON CONSUMER ELECTRONICS) 13 December 1995 (1995-12-13) * column 3, line 8 - column 10, line 33; figures 1-3 *	1,2,8,9	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H01Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	28 March 2000	Villafuerte Abrego

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 12 5145

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28-03-2000

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